FOLIAGE SAMPLING

In New Zealand most forests are affected to some extent by nutrient deficiencies in the soil. Chemical analysis of properly collected foliage samples can be used to identify these deficiencies before they affect tree growth.

HOW TO RECOGNISE A NUTRIENT DEFICIENCY

Trees are weak and small for their age with poor foliage colour. Nutrient deficiencies often have specific visual symptoms.

- **Nitrogen** - yellowing of foliage
- **Phosphorus** - short tufted needles on ends of side branches
- **Boron** - dead buds on main branches
- **Potassium** - older needle tips are lemon yellow in spring
- **Magnesium** - older tips are golden yellow in spring
- **Copper** - twisted branches and stems

Growth rates have already been affected by the time these symptoms appear. The aim of *regular* foliage sampling is to detect deficiencies *before* they affect growth.

Note: other factors can cause some of these visual symptoms. Chemical analysis of foliage samples can help to identify the cause.

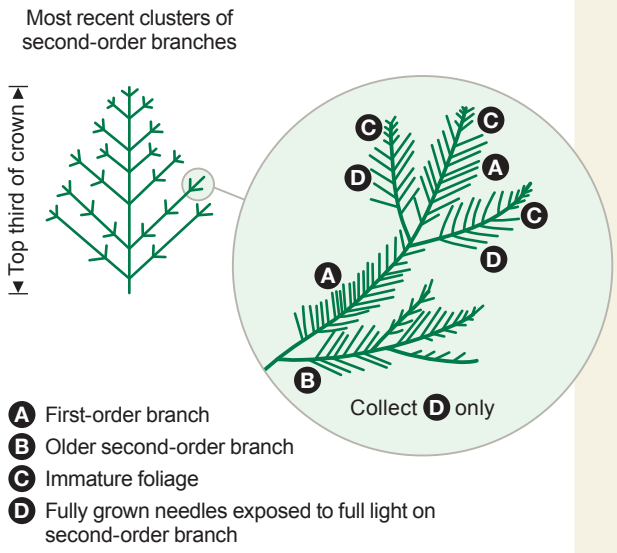
HOW TO COLLECT FOLIAGE SAMPLES

Before samples are collected for foliage analysis, divide a map of the area to be tested, with sample points indicated.

1. The method used to collect foliage samples is determined by tree height:
   Trees up to 6 metres in height: The samples are generally picked by hand.
   Trees between 6 and 11 metres in height: Pole mounted cutters can be used. Different lengths of poles can be used for stands of different heights.
   Trees between 11 and 30 metres in height: A shotgun can be used to collect samples. Make sure of your footing and then insert one round only. Use a 28 to 36 gram load of No. 4 or No. 5 shot. Ear muffs and protective glasses are essential.
   Trees over 30 metres in height: Samples can be collected by climbing. Trees of this height are beyond the range of a shotgun.
   Trees in dense undergrowth: Samples can be collected using a helicopter. This method can be used for trees of any height, but specifically designed equipment subject to Civil Aviation approval is required.

2. Foliage should be collected from 50 trees (10 clusters of five trees) typical of the stand in **February** or **March** when foliage nutrient concentrations are most stable. A sample of this size is necessary to determine precisely **the level** of a nutrient deficiency. A smaller sample, 20 trees (4 clusters of 5 trees), is only sufficient to determine **the presence** *(ie. not the severity)* of a nutrient deficiency. Foliage can be collected regardless of weather conditions.
3. The following foliage should be collected depending on the species:

   ***Pinus radiata*, Douglas-fir and Cypress.** Samples must be taken from fully-grown foliage on the most recent second-order branches exposed to full light in the top third of the crown. If foliage other than the second order is collected, or if collected from lower in the crown, the identification of nutrient deficiencies based on these samples could be misleading.



   Eucalypts. Collect leaves exposed to full light in the top third of the crown. Leaves should be undamaged and fully expanded from the current growing season. For species that have juvenile and adult forms *(e.g. E. nitens)*, adult foliage is preferred.
4. The total sample for any area being assessed should be a large handful of needles or leaves.
5. After the needles are stripped from the branches, they should be placed in a clean plastic bag and kept cold.

HOW TO CARE FOR AND SEND YOUR FOLIAGE SAMPLES?

1. Keep samples cool, clean and dry. Never use planting bags for storage – the fertiliser dust often present in these bags will affect the chemical analysis results. Use new plastic or paper bags.
2. Identify samples by forest, compartment and other relevant information. Fill out the **Foliage Input Form** available from the Veritec website.
3. Pack samples in a strong cardboard carton with the Foliage Input Form.
4. Because foliage samples are perishable, keep them in cold storage if they are not dispatched immediately.
5. Clearly mark the package **FOLIAGE SAMPLES** and send as quickly as possible (avoiding weekends and holidays), to:

Veritec
49 Sala Street, Rotorua
Private Bag 3020, Rotorua 3046

If you require further information email Kaye Eason at kaye.eason@veritec.co.nz or telephone 07 343 5400

WHAT HAPPENS TO FOLIAGE SAMPLES AT THE LABORATORY?

- After samples are unpacked and logged in, a unique laboratory number is given to each sample for precise identification throughout the analytical process.
- The samples are dried in a large forced-air oven at 70°C for about two days to preserve them in a stable condition during storage.
- The oven-dried needles are ground to a fine powder using a Wiley mill.
- Samples are analysed by a variety of instrumentation techniques for the required elements. Computer interpretations are produced from the results of analyses. These identify any nutrient deficiency problems or imbalance. These results and interpretations are checked thoroughly by a Scion plant nutritionist for any anomalies. Using this data and the interpretation, fertiliser operations can be planned with confidence.

VERITEC
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January 2014